SERVICE MANUAL

AI Synthesis Module

M3R

CONTENTS

KORG

KORG INC. 15-12, Shimotakaido 1-chome, Suginami-ku, Tokyo 168

0110 CTH. PRINTED IN JAPAN ①

KORG

1. SPECIFICATIONS

System	: AI synthesis system (full digital processing)
Tone generator	: 16 voice, 16 oscillator
Wave memory	: PCM 16 Mbit
Effect section	: 2 systems of digital multi-effects
Number of program	: 100 programs
Number of combinations	: 100 combinations
Demo	: 5 songs
Outputs	: 1/L, 2/R, 3, 4, headphones
Card slot	: PCM data, programs
MIDI	: IN, OUT, THRU REMOTE jack
Display	: 16 character × 2 line backlit LCD
Options	: RAM card (MCR-03), ROM cards, PCM cards
Power consumption	: 11 W nominal
External dimensions	: 430 (W) × 405 (D) × 88 (H) mm
Weight	: 5.9Kg (not including rack-mount adapter)

* Specifications and appearance are subject to change without notice for product improvement.

ADVARSEL!

Lithiumbatteri. Eksplosionsfare. Udskiftning må kun foretages af en sagkyndig, og som beskrevet i service manualen. Batteriet må kun udskiftes med batterier af samme fabrikat og type.

Litiumparisto!

Pariston saa vaihtaa ainoastaan huoltohenkilöstö saman valmistajan vastaavalla tyypollä. Virheellisestä käsittelystä syntyy räjähdysvaara.

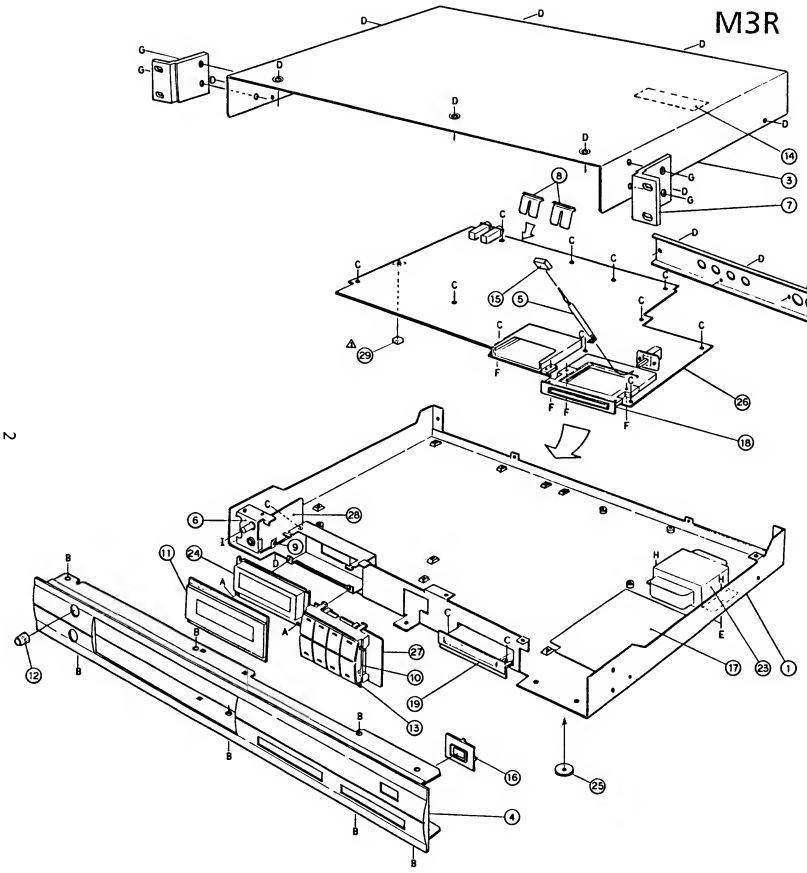
PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
			PSW BAR	
640096800		M.PRT		1
			FIO PLATE	
640096900		M.PRT		1
			RACK MOUNT ADAPTOR	
640097000		M.PRT		2
			FRONT PANEL	
641005200		M.PRT		1
			REAR PANEL	
641005500		M.PRT		1
			LOWER CASE	
641005600		M.PRT		1
			SPRING PLATE	
644003000		M.PRT		2
			PCM CARD SLOT	
646028300		M.PRT		1
			PSW FRAME	
646030200		M.PRT		1
			BATTERY HOLDER	
649007400		871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
600002000	SJT (SU338-56)	M.PRT	117CN	1
600003900	SPT-2 UP-686-J01		117US	1
			117EX	1
600004100	DP-127-J06		100JP	1
			POWER SW. KNOB	
620018200		M.PRT		1
			KNOB	
620020900	(SMALL)	M.PRT		1
			KNOB ASSY.	
620021800		M.PRT		1
			ISOLATION SHEET	
630007500		M.PRT		1
			LCD WINDOW	
630010600		M.PRT		1
			PARAMETER SHEET	
630010900		M.PRT		1
			CARD GUIDE	
640088500		M.PRT		1
			MIDI SHIELD	
640094300		871		1
			COVER	
640096600		M.PRT		1
			PSW SUPPORT	
640096700		871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
464061601	250V T400MA	M.PRT	240AF	2
			220WG	2
			220SC	2
			220FR	2
			240UK	2
464062201	250V T1.6A		220GE	1
			220SE	1
			240GE	1
			240AU	1
			240AF	1
			220WG	1
			220SC	1
			220FR	1
			240UK	1
HARNESSES				
470190500	HNS-905 (14P)	M.PRT		1
470190600	HNS-906 (13P)	872		1
470190700	HNS-907 (8P)	873		1
470190800	HNS-908 (3P)	M.PRT		1
470190900	HNS-909 (2P)			1
CONNECTOR TOPS				
471050500	B5P-VH	871		1
471090200	5096-02C			1
471094030	TXL-P03P-B1			2
471094080	TXL-P08P-B1			1
471094130	TXL-P13P-B1			1
471094140	TXL-P14P-B1			1
BC CONNECTOR				
474009900	L-32	871		1
CARD CONNECTOR				
474011300	HGC0338	871		1
LV CONNECTOR				
474012700	B2P-LV-TN	871		1
IC SOCKET				
480001324	32P DICF-32CS-E	871		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
DIN JACK SOCKET				
480010180	M-1704 (x3)	871		1
RUBBER SPACER				
500012900		M.PRT		1
RUBBER FOOT				
500013000	3x22x3	M.PRT		4
FUSE HOLDER				
515002300	S-N5057 #01	871		8
LITHIC BATTERY				
520001700	CR2032	871		1
KNOB MASK				
550012700		M.PRT		1
HEAT SINKS				
560006100	BL40H-30-BS-AN-0	871		1
560006200	WSD-25-BS-AN-0			1
LED SPACER				
575013908	L=2MM	872		8
AC CORDS				
600000301	CLASS1 (SU429-58)	M.PRT	220GE	1
			240GE	1
			220WG	1
			220SC	1
			240UK	1
600000401	SAA (SU428-58)		240AU	1
600000501	BS PLUG(SU431A-58)		240AF	1
600000901	SEV (SU430-58)		220SE	1
600001301	KP-4819D		220FR	1

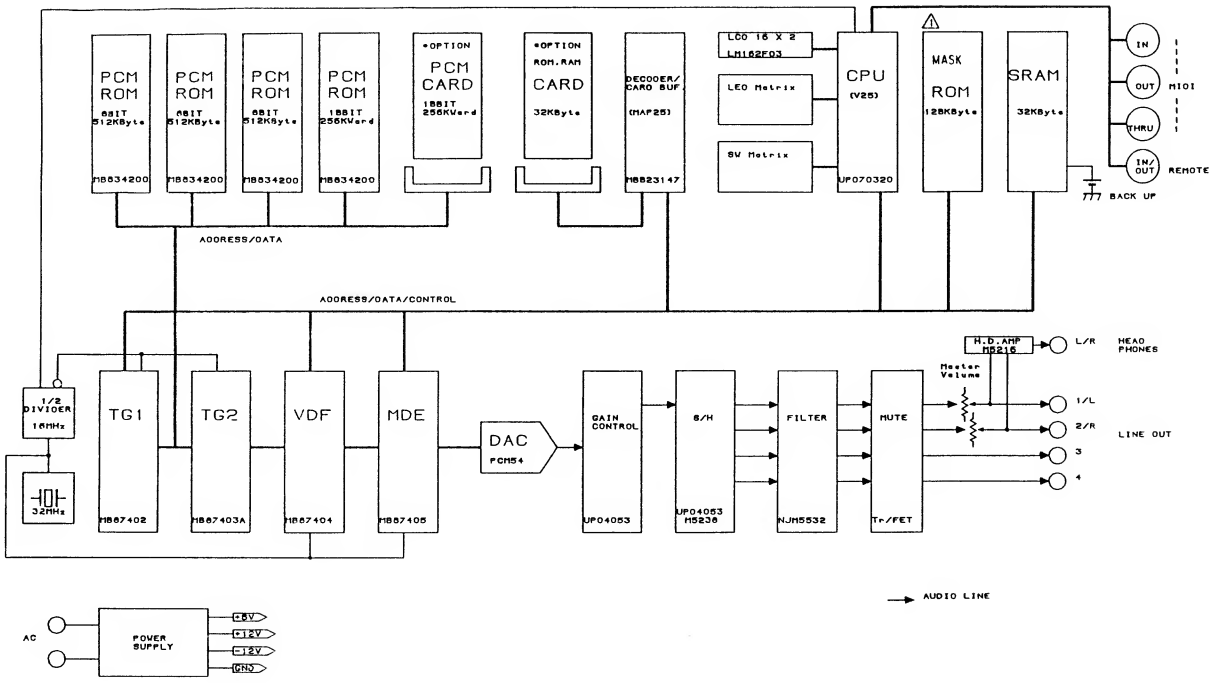
2. STRUCTURAL DIAGRAM



PART NO.	SCREWS & NUT	Q'TY
A	BT B ZMC 2x5	2
B	TS F BZMC 3x6	7
C	CT B ZMC 3x6	14
D	CT B BZMC 3x8	16
E	CT B BZMC 4x10	2
F	PLAX B BZMC 3x10	6
G	TP2G F BZMC 4x10	4
H	FHN ZMC 4	2
I	VN BZMC 7	1

PART NO.	PART NAME	PART CODE
1	LOWER CASE	641005600
2	REAR PANEL	641005500
3	COVER	640096600
4	FRONT PANEL	641005200
5	POWER SW. BAR	640096800
6	FIO PLATE	640096900
7	RACK MOUNT ADAPTOR	640097000
8	SPRING PLATE	644003000
9		
10	KNOB ASSY.	620021800
11	LCD WINDOW	630010600
12	KNOB (SMALL)	620020900
13	KNOB MASK	550012700
14		
15	POWER SW. KNOB	620018200
16	POWER SW. FRAME	646030200
17	ISOLATION SHEET	630007500
18	CARD GUIDE	640088500
19	PCM CARD SLOT	646028300
20	BUSHING	
21	AC CARD	
22	NAME PLATE	
23	POWER TRANSFORMER	400012000
24	LCD	313001900
25	RUBBER FOOT	500013000
26	P.C.BOARD KLM-871	001087100
27	P.C.BOARD KLM-872	001087100
28	P.C.BOARD KLM-873	001087100
29	RUBBER SPACER	500012900

3. BLOCK DIAGRAM



PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
320011100	M5M4464AL-12	871	D.RAM	5
320011117	M51953BL		RESET	1
320012049	MB87402PF		TG1	1
320012050	MB87403APF		TG2	1
320012051	MB87404PF		VDF	1
320012052	MB87405PF		MDE	1
320012058	MB83512-15P-259		MASK ROM	1
320012072	MB62314PF		MAP25	1
320012076	MB834200A-20P-2A0		MASK ROM	1
320012077	MB834200A-20P-2A1		MASK ROM	1
320012078	MB834200A-20A-2A2		MASK ROM	1
320012079	MB834200A-20A-2A3		MASK ROM	1
320036006	PCM54HP-005		DAC	1
PHOTO COUPLER				
330001400	PC-910K	871		2
CRYSTAL				
335005500	HC-49/U 32MHz	871		1
P.C.BOARD				
001087100	KLM-871/72/73			1
SEMI FIXED VR				
350002410	RH0615C 100K	871		1
VR				
362005300	RK0971220x45A 10KBx2	873		1
POWER SW.				
375007800	ESB-8213V	871		1
TACT SW.				
375008500	SKHHAJ	872		8
POWER TRANSFORMER				
400012000	TC-800	M.PRT		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
COILS				
402002300	BL02RN2-R62	871		5
		873		2
402002800	2943-666671	871		10
PHONE JACKS				
454004300	YKB21-5012	871		4
454004400	YKB21-5010	873		1
DIN JACK				
454006700	YKF-51-5014A	871		1
FUSE				
464002401	125V 2.5A UL	M.PRT	117US	1
			117CN	1
			117EX	1
			100JP	1
464011901	250V 0.8A UL		117US	1
			117CN	1
			117EX	1
			100JP	1
464012003	250V 1.0A UL		117US	2
			117CN	2
			117EX	2
			100JP	2
464061301	250V T200MA		220GE	1
			220SE	1
			240GE	1
			240AU	1
			240AF	1
			220WG	1
			220SC	1
			220FR	1
			240UK	1
464061601	250V T400MA		220GE	2
			220SE	2
			240GE	2
			240AU	2

8. PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
	BLOCK RESISTORS			
13500510	RKC1/8S5J 10K	871		2
13500610	RKC1/8S6J 10K			4
13500710	RKC1/8S7J 10K			1
13500810	RKC1/8S8J 10K			2
13500910	RKC1/8S9J 10K			1
13501010	RKC1/8S10J 10K			3
	FUSE RESISTOR			
184016233	1/6WJ 33 OHM	871		2
	EMI FILTERS			
219050100	DSS310-55D223S	871		1
219050800	NFV610-655 T2A 206			2
219050900	NFV610-655 T2A 506			1
	ELECTROLYTIC CAPACITORS			
235011422	25V 2200UF	871		2
239027447	16V 4700UF			1
254003210	16V 10UF			7
254003322	16V 220UF			2
254003347	16V 470UF			3
254004310	25V 100UF			5
254006010	50V 0.1UF			1
254063222	16V 22UF			2
254064210	25V 10UF			8
254066110	50V 1UF			2
	PPC			
264003433	100V 3300PF	871		4
	TRANSISTORS			
304000020	2SA1175 TK	871		3
304020020	2SC2785 TK			6
304020100	BA1A4M-T			4
304020110	BN1A4M-T			2
304020180	2SC2878 A/B			4

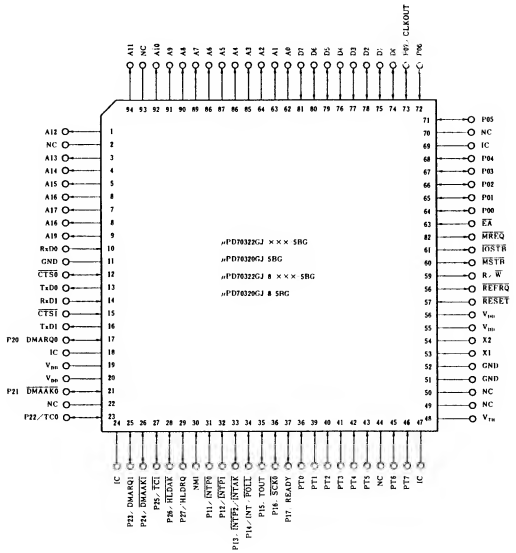
PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
	FET			
304060022	2SK381-T11-B/C	871		4
	DIODES			
310002100	SR1M-2	871		1
314001300	1SS-133	872		9
				8
	BRIDGE DIODES			
310011000	KBL02L-6176	871		1
310011100	KBP02ML6127			1
	LED			
312007800	GL3HHD8	872		8
	LCD			
313001900	LM162F03	M-PRT		1
	ZENER DIODES			
314023900	RD5.1ESB1-T	871		2
314024900	RD1.1ESB2-T			1
	ICs			
320001063	UPD-4053BC	871	C MOS	3
320001068	UPD74HCU04C		HC MOS	1
320001094	UPD74HC139C		HC MOS	1
320001097	UPD74HC04C		HC MOS	2
320001128	UPD43256C-15L		S.RAM	1
320001138	UPD27C1000AD-15		EP ROM	1
320001162	UPD23C512EC-039		MASK ROM	1
320001209	UPD43256AC-15LL		S.RAM	1
320001210	UPD703206GJ-8-5BG		CPU	1
320009057	NJM-7805FA		REG	1
320009072	NJM-5532S		OP AMP	8
320009078	NJM78M12FA		REG	1
320009079	NJM79M12FA		REG	1
320011026	M-5216L		OP AMP	1
320011067	M74ALS74P		ALS	1
320011076	M5238L		OP AMP	3

5. P.C. BOARD

KLM871/872/873

6. REFERENCE DATA

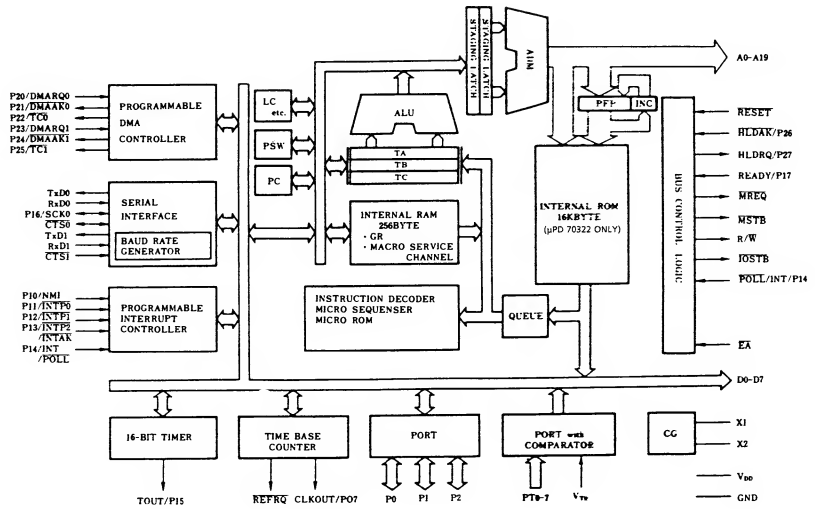
UPD 70320 G-8-5-BG



PIN FUNCTION

Pin Name	I/O	Pin Name	I/O	Pin Name	I/O
P00-P06	I/O	TXD0	O	$\overline{EA}$	I
P07	I/O	TXD1	O	X1	I
NMI	I	RXD0	I	X2	I
$\overline{INTP0}$	I	RXD1	I	D0-D7	I/O
$\overline{INTP1}$	I	$\overline{CTS0}$	I/O	A0-A19	O
$\overline{INTP2}$	I	$\overline{CTS1}$	I	$\overline{MREQ}$	O
P14-P17	I/O	$\overline{REFRQ}$	O	$\overline{MSTB}$	O
P20-27	I/O	VTH	I	R/$\overline{W}$	O
PT0-PT7	I	$\overline{RESET}$	I	$\overline{IOSTB}$	O
VDD	-	GND	-	IC	-

BLOCK DIAGRAM



T3:OUT OUT 1 MAX
:
T3:OUT PH/R MAX

Sin wave is output from OUT 1.
When [▲/YES] SW. is pressed in order,
the output changes from OUT 1 to PH/R as the noise is meisured.
Refer to the fig. 2 to see each output level and frequency.
In this case, confirm that the difference of the level of the pair outputs(OUT 1 and OUT 2, OUT 3 and OUT4, PH/R and PH/L) should be within 400mV.

	OUT 1	OUT 2	OUT 3	OUT 4	PH/L	PH/R
NOISE LEVEL (-dBm)	73.0	73.0	72.0	72.0	74.0	74.0
OUTPUT LEVEL (Vpp)	5.0～9.0	5.0～9.0	6.0～10	6.0～10	6.0	6.0
FREQUENCY (Hz)	488	411	305	244	549	610

fig. 2

6) VDF, MDE CHECK

T4:VDF

When [▲/YES] SW. is pressed at this time,
the program for VDF check starts.
Confirm that the sound like the explosion is output
while [▲/YES] SW. is being pressed for less than 2 second.
Press [▲/YES] SW. and proceed to the next check.

T5:MDE TEST 1

The program for MDE check starts by pressing [▲/YES] SW. again.
About 12Vpp sin wave is output on TEST 1. (fig. 3)
Press [▲/YES] SW. again and the display changes to TEST 2.
If [▲/YES] SW. is pressed for 3 sec. and no sound is heard,
it's normal.
Press [▲/YES] SW. and proceed to the next check.

7) RAM CARD TEST

T6:RAM CARD Insert RAM CARD

When RAM CARD (MCR-03) is put into the card slot,
the protect switch is off and [▲/YES] SW. is pressed here,
RAM CARD WRITE/READ TEST is done.

When this test is finished normally, PRELOAD DATA is transmitted
from M3R ROM to M3R RAM and TEST MODE is changed to the normal mode.

4) TG TEST

Connect the oscilloscope to OUT 1 of M3R.
Turn the master volume of M3R to MAX.

T2:TG WAVE

LCD display indicates as left.
Press [▲/YES] SW.

T2:TG WAVE 1

While the display is indicating as left,
TG TEST WAVE 1 is output from OUT 1.

Confirm that WAVE 1 outputs neither sound nor noise.
Press [▲/YES] SW.

T2:TG WAVE 2

Confirm that WAVE 2 also outputs neither sound nor noise.
Press [▲/YES] SW.

T2:TG WAVE 3

Confirm the waveform like fig. 1.
Press [▲/YES] SW.

T2:TG WAVE 4

Confirm the waveform like fig. 2.
Press [▲/YES] SW.

T2:TG WAVE 5

Confirm the waveform like fig. 3.
When [▲/YES] SW. is pressed again,
the process changes to the next.

5) OUTPUT TEST

T3:OUT

LCD display indicates as left.
Press [▲/YES] SW.

T3:OUT OUT 1 OFF

The display indicates as left.
Connect the noise meter to the output that is indicated
on the display and meisure the noise level.

T3:OUT OUT 2 OFF

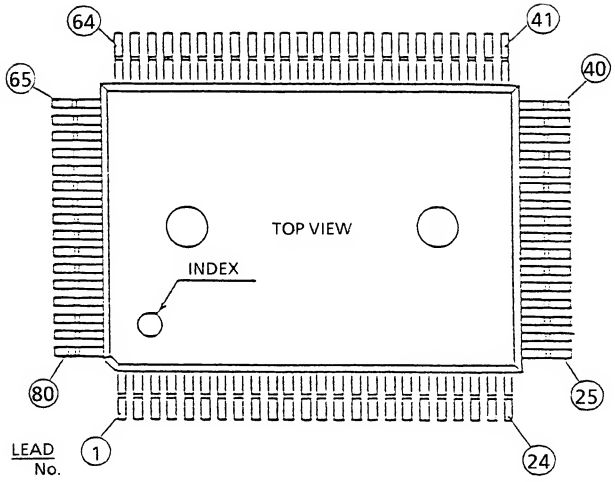
Press [▲/YES] SW. in order at this time
and meisure the noise level of OUT 1～ OUT 4, PH/L, PH/R.

:

T3:OUT PH/R OFF

The next is the meisure of the output level.
Press [▲/YES] SW.

MB 623147 (MAP 25)



PIN FUNCTION

No.	I/O	Pin Name	No.	I/O	Pin Name
1	I	IA19	21	I	IA8
2	I	IA18	22	I	IA7
3	I	IA17	23	I	IA6
4	I	IA16	24	I	IA5
5	I	IA15	25	I	IA4
6	I	IA14	26	I	IA3
7	I	IA13	27	I	IA2
8	I/O	PD7	28	I	IA1
9	I/O	PD6	29	I	IA0
10	I/O	PD5	30	I	MREQ
11	I/O	PD4	31	I	MODE
12	-	VSS	32	-	VSS
13	I/O	PD3	33	-	VDD
14	I/O	PD2	34	I	IOST
15	I/O	PD1	35	I	RW
16	I/O	PD0	36	O	MRD
17	I	IA12	37	O	MWR
18	I	IA11	38	O	IORD
19	I	IA10	39	O	IOWR
20	I	IA9	40	O	OA12

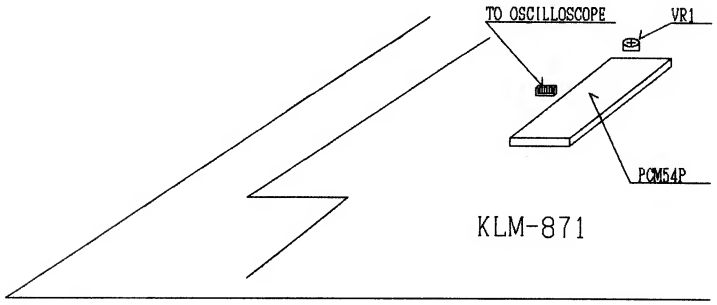
No.	I/O	Pin Name	No.	I/O	Pin Name
41	O	OA7	61	O	OA11
42	O	OA6	62	O	OA9
43	O	OA5	63	O	OA8
44	O	OA4	64	O	OA13
45	O	OA3	65	O	OA14
46	O	OA2	66	O	CDWR
47	O	OA1	67	O	IOSO
48	O	OA0	68	O	IOS1
49	I/O	DO	69	O	IOS2
50	I/O	D1	70	O	IOS3
51	I/O	D2	71	O	IOS4
52	-	VSS	72	-	VSS
53	I/O	D3	73	-	VDD
54	I/O	D4	74	O	IOS5
55	I/O	D5	75	O	MSOO
56	I/O	D6	76	O	MSO1
57	I/O	D7	77	O	MSO2
58	O	CDCS	78	O	MSO3
59	O	OA10	79	O	MS6
60	O	CDRD	80	O	MS7

7. CHECK AND ADJUSTMENT

Check and adjustment of KLM-871 p. c. board

1) Connect the oscilloscope to the test point (TP1) on KLM-871.
(The right side is GND and the left side is the output signal when you see the test point from the front side of M3R.)

fig. 1

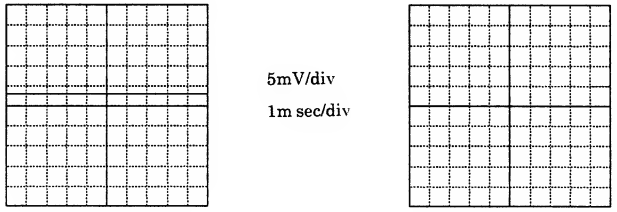


2) When power is turned on, two indications below are appeared in order.

KORG AI Synthesis M3R	--------)	I00 Krypton I29 I74 I35 I27

(This example is appeared in case of PRELOAD DATA.)

Confirm that DC level on the oscilloscope indicates 0V at this time.
If not, adjust with VR1 on KLM-871.



NG GOOD

Before you start TEST MODE

When M3R is changed to TEST MODE, all data is broken.
So save the important data to RAM card etc. before you start.

1 How to start TEST MODE

Turn the switch on while pressing [COMBI] and [PROG].
The display indicates TEST MODE after the SELF TEST is finished automatically.
SELF TEST ---- Confirm that the inside SRAM works normally.
Note that the data in M3R is lost by this operation.

2 TEST MODE

1) MENU SCREEN

After the SELF TEST is finished normally, the display indicates these letters below automatically.

M3R TEST MODE Ver. xx	xx indicates the ROM version number.

2) SW & LED TEST

T1:SW/LED	When [▲/YES] SW. is pressed, the display indicates as left.
T1:SW/LED PLAY	When [▲/YES] SW. is pressed again, the display indicates the name of the key which should be pressed as left and LEDs with SW light simultaneously. Press SWs whose LEDs light exaclty in order.
T1:SW/LED NO	When the last [▲/YES] SW. is pressed, the process changes to the next.

3) LCD TEST

T1:LCD	LCD display indicates as left.
▮▮▮▮▮▮▮▮	When [▲/YES] SW. is pressed, all dots are lit as left.
	When [▲/YES] SW. is pressed again, all dots are put out. When [▲/YES] SW. is pressed again, the process changes to the next.